# CLAIMS

1. An apparatus comprising:

memory means for storing relationship information generated by learning based on camera motion estimation information expressing motion of a video camera, which is detected by a desired image signal picked up by the video camera, and camera motion information expressing physical motion of the video camera, which was obtained by a sensor for detecting physical motion at the same time when the desired image signal was picked up by the video camera;

camera motion estimation information detection means for detecting camera motion estimation information with respect to an inputted image signal, from the inputted image signal; and

camera motion prediction information generation means for generating camera motion prediction information with respect to the inputted image signal, based on the camera motion estimation information detected by the camera motion estimation information detection means and the relationship information.

2. The apparatus according to claim 1, further comprising vibration signal generation means for generating a vibration signal for vibrating an object.

3. The apparatus according to claim 2, further comprising drive means for driving the object, based on the vibration signal.

4. The apparatus according to claim 2, further comprising a chair as the object.

5. The apparatus according to claim 4, further comprising display means for displaying the input image signal in synchronization with the drive means.

6. The apparatus according to claim 1, wherein the camera motion estimation includes a motion vector detection section for detecting a motion vector from the inputted image signal, a motion center detection section for detecting a motion center, based on the motion vector, and a camera motion estimation information detection section for detecting the camera motion estimation information, based on the motion vector and the motion center.

7. The apparatus according to claim 6, wherein the motion center detection section includes an integration section for integrating the motion vector over a plurality of frames at each of a plurality of pixel positions, and a motion center determination section for deciding the motion center, based on an integration result from the integration section.

8. The apparatus according to claim 7, wherein the integration section integrates individually a horizontal component and a vertical component of the motion vector.

9. The apparatus according to claim 6, wherein the motion vector detection section detects the motion vector, with respect to a plurality of preset representative points of the inputted image signal.

10. The apparatus according to claim 1, comprising an acceleration sensor as the sensor.

11. The apparatus according to claim 1, comprising an angular speed sensor as the sensor.

12. The apparatus according to claim 1, wherein the camera motion estimation information detection means generates the camera motion estimation information which is constructed by plural kinds of components.

13. The apparatus according to claim 1, wherein the camera motion prediction information generation means generates the camera motion prediction information corresponding to the inputted image signal, by a linear combination of the camera motion estimation information and the relationship information.

14. A learning apparatus comprising:

camera motion estimation information detection means for detecting camera motion estimation information from a desired image signal picked up by a video camera; and

coefficient generation means for generating a conversion coefficient for generating camera motion prediction information expressing motion of the video camera which picked up an arbitrary image signal, from the arbitrary image signal, based on sensor signal expressing physical motion of the video camera, which is obtained by a sensor for detecting physical motion, at the same time when the desired image signal was picked up, and the camera motion estimation information.

15. The apparatus according to claim 14, wherein the camera motion estimation includes a motion vector detection section for detecting a motion vector

from the inputted image signal, a motion center detection section for detecting a motion center, based on the motion vector, and a camera motion estimation information detection section for detecting the camera motion estimation information, based on the motion vector and the motion center.

16. The apparatus according to claim 15, wherein the motion center detection section includes an integration section for integrating the motion vector over a plurality of frames at each of a plurality of pixel positions, and a motion center determination section for deciding the motion center, based on an integration result from the integration section.

17. The apparatus according to claim 16, wherein the integration section integrates individually a horizontal component and a vertical component of the motion vector.

18. The apparatus according to claim 15, wherein the motion vector detection section detects the motion vector, with respect to a plurality of preset representative points of the inputted image signal.

19. The apparatus according to claim 15, comprising an acceleration sensor as the sensor.

20. The apparatus according to claim 15, comprising an angular speed sensor as the sensor.

21. The apparatus according to claim 15, wherein the camera motion estimation information detection means generates the camera motion estimation

information which is constructed by plural kinds of components.

22. An information processing method comprising:

a step of generating relationship information generated by learning based on camera motion estimation information expressing motion of a video camera, which is detected by a desired image signal picked up by the video camera, and camera motion information expressing physical motion of the video camera, which was obtained by a sensor for detecting physical motion at the same time when the desired image signal was picked up by the video camera;

a step of detecting camera motion estimation information with respect to an inputted image signal, from the inputted image signal; and

a step of generating camera motion prediction information with respect to the inputted image signal, based on the camera motion estimation information detected and the relationship information.

23. The method according to claim 22, further comprising a step of generating a vibration signal for vibrating an object.

24. The method according to claim 23, further comprising a step of driving the object, based on the vibration signal.

25. The method according to claim 24, wherein a chair is used as the object in the step of driving the object.

26. The method according to claim 24, further comprising a step of displaying the input image signal in synchronization with the driving.

27. The method according to claim 22, wherein the step of detecting the camera motion estimation information includes a step of detecting a motion vector from the inputted image signal, a step of detecting a motion center, based on the motion vector, and a step of detecting the camera motion estimation information, based on the motion vector and the motion center.

28. The method according to claim 27, wherein in the step of detecting the motion center, the motion vector is integrated over a plurality of frames at each of a plurality of pixel positions, and the motion center is detected, based on an integration result therefrom.

29. The method according to claim 28, wherein in the step of detecting the motion center, a horizontal component and a vertical component of the motion vector are individually integrated.

30. The method according to claim 27, wherein in the step of detecting the motion vector, the motion vector is detected with respect to a plurality of preset representative points of the inputted image signal.

31. The method according to claim 22, wherein in the step of generating the relationship information, the relationship information is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an acceleration sensor as the sensor.

32. The method according to claim 22, wherein in the step of generating the relationship information, the relationship information is generated, based on camera

motion information expressing physical motion of the video camera, which was obtained by an angular speed sensor as the sensor.

33. The method according to claim 22, wherein in the step of detecting the camera motion estimation information, the camera motion estimation information which is constructed by plural kinds of components is generated.

34. The method according to claim 22, wherein in the step of generating the camera motion prediction information, the camera motion prediction information corresponding to the inputted image signal is generated by a linear combination of the camera motion estimation information and the relationship information.

35. A learning method comprising:

a step of detecting camera motion estimation information from a desired image signal picked up by a video camera; and

a step of generating a conversion coefficient for generating camera motion prediction information expressing motion of the video camera which picked up an arbitrary image signal, from the arbitrary image signal, based on sensor signal expressing physical motion of the video camera, which is obtained by a sensor for detecting physical motion, at the same time when the desired image signal was picked up, and the camera motion estimation information.

36. The method according to claim 35, wherein the step of detecting the camera motion estimation information includes a step of detecting a motion vector from the inputted image signal, a step of detecting a motion center, based on the

motion vector, and a step of detecting the camera motion estimation information, based on the motion vector and the motion center.

37. The method according to claim 36, wherein in the step of detecting the motion center, the motion vector is integrated over a plurality of frames at each of a plurality of pixel positions, and the motion center is detected, based on an integration result therefrom.

38. The method according to claim 37, wherein in the step of detecting the motion center, a horizontal component and a vertical component of the motion vector are individually integrated.

39. The method according to claim 36, wherein in the step of detecting the motion vector, the motion vector is detected with respect to a plurality of preset representative points of the inputted image signal.

40. The method according to claim 36, wherein in the step of generating the conversion coefficient, the conversion coefficient is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an acceleration sensor as the sensor.

41. The method according to claim 36, wherein in the step of generating the conversion coefficient, the conversion coefficient is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an angular speed sensor as the sensor.

42. The method according to claim 36, wherein in the step of detecting the

camera motion estimation information, the camera motion estimation information which is constructed by plural kinds of components is generated.

43. A program recording medium which records a program for letting a computer execute information processing, the program comprising:

a step of generating relationship information generated by learning based on camera motion estimation information expressing motion of a video camera, which is detected by a desired image signal picked up by the video camera, and camera motion information expressing physical motion of the video camera, which was obtained by a sensor for detecting physical motion at the same time when the desired image signal was picked up by the video camera;

a step of detecting camera motion estimation information with respect to an inputted image signal, from the inputted image signal; and

a step of generating camera motion prediction information with respect to the inputted image signal, based on the camera motion estimation information detected and the relationship information.

44. The medium according to claim 43, wherein the program further comprises a step of generating a vibration signal for vibrating an object.

45. The medium according to claim 44, wherein the program further comprises a step of driving the object, based on the vibration signal.

46. The medium according to claim 45, wherein a chair is used as the object in the step of driving the object.

47. The medium according to claim 45, wherein the program further comprises a step of displaying the input image signal in synchronization with the driving.

48. The medium according to claim 43, wherein the step of detecting the camera motion estimation information includes a step of detecting a motion vector from the inputted image signal, a step of detecting a motion center, based on the motion vector, and a step of detecting the camera motion estimation information, based on the motion vector and the motion center.

49. The medium according to claim 48, wherein in the step of detecting the motion center, the motion vector is integrated over a plurality of frames at each of a plurality of pixel positions, and the motion center is detected, based on an integration result therefrom.

50. The medium according to claim 49, wherein in the step of detecting the motion center, a horizontal component and a vertical component of the motion vector are individually integrated.

51. The medium according to claim 48, wherein in the step of detecting the motion vector, the motion vector is detected with respect to a plurality of preset representative points of the inputted image signal.

52. The medium according to claim 43, wherein in the step of generating the relationship information, the relationship information is generated, based on camera motion information expressing physical motion of the video camera, which was

obtained by an acceleration sensor as the sensor.

53. The medium according to claim 43, wherein in the step of generating the relationship information, the relationship information is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an angular speed sensor as the sensor.

54. The medium according to claim 43, wherein in the step of detecting the camera motion estimation information, the camera motion estimation information which is constructed by plural kinds of components is generated.

55. The medium according to claim 43, wherein in the step of generating the camera motion prediction information, the camera motion prediction information corresponding to the inputted image signal is generated by a linear combination of the camera motion estimation information and the relationship information.

56. A recording medium which records a program for letting a computer execute learning processing, the program comprising:

a step of detecting camera motion estimation information from a desired image signal picked up by a video camera; and

a step of generating a conversion coefficient for generating camera motion prediction information expressing motion of the video camera which picked up an arbitrary image signal, from the arbitrary image signal, based on sensor signal expressing physical motion of the video camera, which is obtained by a sensor for detecting physical motion, at the same time when the desired image signal was picked

up, and the camera motion estimation information.

57. The medium according to claim 56, wherein the step of detecting the camera motion estimation information includes a step of detecting a motion vector from the inputted image signal, a step of detecting a motion center, based on the motion vector, and a step of detecting the camera motion estimation information, based on the motion vector and the motion center.

58. The medium according to claim 57, wherein in the step of detecting the motion center, the motion vector is integrated over a plurality of frames at each of a plurality of pixel positions, and the motion center is detected, based on an integration result therefrom.

59. The medium according to claim 58, wherein in the step of detecting the motion center, a horizontal component and a vertical component of the motion vector are individually integrated.

60. The medium according to claim 56, wherein in the step of detecting the motion vector, the motion vector is detected with respect to a plurality of preset representative points of the inputted image signal.

61. The medium according to claim 56, wherein in the step of generating the conversion coefficient, the conversion coefficient is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an acceleration sensor as the sensor.

62. The medium according to claim 56, wherein in the step of generating the

conversion coefficient, the conversion coefficient is generated, based on camera motion information expressing physical motion of the video camera, which was obtained by an angular speed sensor as the sensor.

63. The medium according to claim 56, wherein in the step of generating the camera motion estimation information, camera motion estimation information which is constructed by plural kinds of components is generated.